

THELYTOKY OR ARRHENOTOKY IN
SCLERODERMUS IMMIGRANS

BY JOHN COLBURN BRIDWELL,

Glencarlyn, Virginia.

Parthenogenesis is a common occurrence among hymenoptera. Usually it is androgenetic, only males being produced by virgin females. This phenomenon has also been termed arrhenotoky. It is so general among hymenoptera as to lead many students of the group to believe that all the species of the order may breed in this way except for the few which have developed thelytoky, virgin females producing females. Certain Eupelmidae and Encyrtidae among the Chalcidoidea, and some Ichneumonidae have been bred through many generations without males appearing and have to all appearances entirely eliminated sexual reproduction as a part of ontogeny. In other instances however after long periods of gynogenetic parthenogenesis, small numbers of males appear and it is far from certain that any of the species have become perfectly thelytokous. I know of no species, however, which produce large numbers of males and also produce females parthenogenetically. The notes by Dr. Keeler, 1929 (*Psyche* 36:41-44) on thelytoky in *Scleroderma immigrans* are so much at variance with my experience in breeding *Sclerodermus*¹ that I am convinced an error of observation has misled him.

The discussion of the biology of *Sclerodermus immigrans* Bridwell and its endemic Hawaiian congeners may be found in the Proceedings of the Hawaiian Entomological Society 4:291-305, 1920. In the course of the work recorded several thousand individuals of this species were reared under very close and long continued observation and among them were many known virgin females whose progeny in every instance were males. In many instances the lots of

¹It may not be superfluous to note again that *Sclerodermus* is Latreille's original spelling of this generic name and *Scleroderma* a wholly unnecessary emendation on the part of Westwood.

young produced by old females near the end of their egg-laying periods were all males, the sperms from mating having presumably been exhausted or were dead. Nothing in all this work suggested the possibility of thelytoky. The only other species of *Sclerodermus* bred in large numbers is *S. macrogaster* Ashmead which I found at Kingsville, Texas in January, 1920 and bred through several generations at Brownsville and at Washington until opportunity presented itself to put it in the hands of Dr. Wheeler for study. Since its biology differed but little from that of *immigrans* and its Hawaiian congeners, no detailed account of these studies was published. A note upon it was presented to the Entomological Society of Washington as recorded in 1922, (Journ. Washington Acad. Sci. 12:274). In this species also the phenomena of arrhenotoky were observed, probably in more instances than in *immigrans*. In it, as in *immigrans*, about one third of the females were winged while only a small fraction of one per cent of the males were wingless.

If we review the conditions under which the progeny of *Sclerodermus* are produced we may see how a misunderstanding might arise. After the prey is mastered several eggs are laid upon it and the resulting larvæ and their mother feed upon it. When the larvæ are ready for transformation they spin separate cocoons so massed and attached to each other as to make it impossible to separate them without injury. The males emerge before the females and bite their way into the female cocoons and mate there before any of them have made their appearance in the open. The males are short lived and often only one or two appears in a mass of cocoons such as would produce eight females. Dr. Keeler intended keeping eight of the females of his F 3 generation virgin and from these supposedly virgin females only female progeny were produced. Since he does not detail the precautions taken to keep them from mating, I believe that these had mated before they were separated and that the few (normally not more than one fifth) male larvæ died before transforming.